

Amendments to the Claims

This listing of claims will replace all prior versions, and listing, of claims in the application:

Listing of Claims:

1. (Amended) A method for making a thin silicon structure comprising the steps of:
 - providing a glass wafer or substrate;
 - providing a silicon wafer having a first substantially planar surface and a second substantially planar surface;
 - forming a recess in said glass wafer or silicon wafer first surface;
 - bonding said silicon wafer to said glass wafer such that at least part of said silicon wafer first surface bonds to said glass wafer and at least part of said silicon wafer first surface overhangs said recess; ~~and~~
 - after said bonding step, selectively removing a portion of said silicon wafer from said silicon wafer second surface through to said silicon wafer first surface such that a silicon structure is formed overhanging said recess;

providing a metal layer on the first substantially planar surface of the second wafer, such that the metal layer is patterned to approximately coincide with said recess;

stopping the selective removal step at or near said metal layer to form the silicon structure; and

removing said metal layer.

and

~~wherein at least one portion of said silicon wafer is not connected to another portion of said silicon wafer.~~

2. (Original) A method for making a thin silicon structure as in claim 1, further comprising forming at least one electrode on said glass wafer within said recess.

3. (Original) A method for making a thin silicon structure as in claim 2, wherein said electrode forming step includes forming a titanium-platinum electrode.

4. (Original) A method for making a thin silicon structure as in claim 2, wherein said electrode forming step includes forming a gold electrode.

5. (Original) A method for making a thin silicon structure as in claim 1, wherein said bonding step includes anodic bonding.

6. (Original) A method for making a thin silicon structure as in claim 1, wherein said selectively removing silicon step includes a DRIE process.

7. (Original) A method for making a thin silicon structure comprising the steps of:

providing a glass wafer or substrate;

providing a silicon wafer having a first substantially planar surface and a second substantially planar surface;

forming a recess in said glass wafer surface or said silicon wafer;

providing a patterned metal layer adjacent the silicon wafer, the patterned metal layer coinciding with said recess;

bonding said silicon wafer to said glass wafer such that at least part of said silicon wafer first surface bonds to said glass wafer and overhangs said recess;

selectively etching said silicon wafer above said recess from said second surface through to said first surface and stopping at or near said metal layer to form a silicon structure that at least partially overhangs said recess; and

removing said metal layer.

8. (Original) A method for making a thin silicon structure as in claim 7, further comprising forming at least one electrode on said glass wafer that is in alignment with at least part of said recess.

9. (Original) A method for making a thin silicon structure as in claim 7, wherein said bonding step includes anodic bonding.

10. (Original) A method for making a thin silicon structure as in claim 7, wherein said etching step includes a DRIE process.

11. (Original) A method for making a thin silicon structure as in claim 8, wherein said electrode forming step includes forming a titanium-platinum electrode.

12. (Original) A method for making a thin silicon structure as in claim 8, wherein said electrode forming step includes forming a gold electrode.

13. (Original) A method for making a thin silicon structure as in claim 8, wherein said electrode includes an electrode tab or ear extending nearer the unrecessed surface of the glass wafer or silicon wafer.

14. (Amended) A method for making a thin structure, comprising:

providing a first wafer or substrate;

providing a second wafer having a first substantially planar surface and a second substantially planar surface;

forming a recess in said first wafer substrate;

bonding said second wafer to said first wafer such that at least part of said second wafer first surface bonds

to said first wafer so that at least part of said second wafer first surface overhangs said recess;~~and~~

after said bonding step, selectively removing a portion of said second wafer from said second wafer second surface through to said second wafer first surface such that a thin structure is formed overhanging said recess;

providing a patterned metal layer on the first substantially planar surface of the second wafer, such that the metal layer is patterned to coincide with said recess;

stopping the selective removal step at or near said metal layer to form the thin structure; and

removing said metal layer.

and

wherein at least one portion of said second wafer is not connected to another portion of said second wafer.

15. (Original) A method for making a thin structure as in claim 14, wherein the first wafer or substrate is a glass wafer or substrate.

16. (Original) A method for making a thin structure as in claim 15, wherein the second wafer is a silicon wafer.

17. (Original) A method for making a thin structure as in claim 14, wherein the first wafer or substrate is a silicon wafer.

18. (Original) A method for making a thin structure as in claim 17, wherein the second wafer is a glass wafer or substrate.

19. (Canceled)

20. (Amended) A method for making a thin structure comprising the steps of:

providing a first substrate having a first substantially planar surface and a second substantially planar surface;

providing a second substrate having a first substantially planar surface and a second substantially planar surface;

forming a recess in said first substantially planar surface of said first substrate and/or said first substantially planar surface of said second substrate;

securing said first substrate to said second substrate such that said first substantially planar surface of said first substrate faces said first substantially planar surface of said second substrate; and

after said securing step, selectively removing a portion of said first substrate from said second substantially planar surface of said first substrate such that a structure is formed overhanging said recess;

providing a metal layer on the first substantially planar surface of the second wafer, such that the metal layer is patterned to approximately coincide with said recess;

stopping the selective removal step at or near said metal layer to form the structure; and

removing said metal layer.

~~and~~

~~wherein at least one portion of said first substrate is not connected to another portion of said first substrate.~~

21. (Amended) A method for making a thin structure comprising the steps of:

providing a first substrate having a first substantially planar surface and a second substantially planar surface;

providing a second substrate having a first substantially planar surface and a second substantially planar surface;

forming a recess in said first substantially planar surface of said first substrate and/or said first substantially planar surface of said second substrate;

securing said first substrate to said second substrate such that said first substantially planar surface of said first substrate faces said first substantially planar surface of said second substrate; and

selectively removing a portion of said first substrate from said second substantially planar surface of said first substrate such that a thin structure is formed overhanging said recess, said thin structure being doped at a concentration of between zero and 1×10^{18} atm/cm³;

providing a metal layer on the first substantially planar surface of the second wafer, such that the metal layer is patterned to approximately coincide with said recess;

stopping the selective removal step at or near said metal layer to form the thin structure; and

removing said metal layer; and

wherein at least one portion of said first substrate is not connected to another portion of said first substrate.

22. (Canceled)

23. (Previously Added) A method for making a thin structure, comprising:

providing a first substrate having a first substantially planar surface and a second substantially planar surface;

providing a second substrate having a first substantially planar surface and a second substantially planar surface;

forming a recess in said first substantially planar surface of said first substrate and/or said first substantially planar surface of said second substrate;

providing a metal layer on the first substantially planar surface of the second substrate adjacent said recess;

securing said second substrate to said first substrate such that said first substantially planar surface of said first substrate faces said first substantially planar surface of said second substrate;

selectively removing a portion of said second substrate from said second substrate second substantially planar surface through to said second substrate first substantially planar surface such that a thin structure is formed overhanging said recess;

stopping the selective removal step at or near said metal layer to form the thin structure; and

removing said metal layer.

24. (New) A method for making a thin silicon structure comprising the steps of:

providing a glass wafer or substrate;

providing a silicon wafer having a first substantially planar surface and a second substantially planar surface;

forming a recess in said glass wafer or silicon wafer first surface;

bonding said silicon wafer to said glass wafer such that at least part of said silicon wafer first surface bonds to said glass wafer and at least part of said silicon wafer first surface overhangs said recess;

after said bonding step, selectively removing a portion of said silicon wafer from said silicon wafer second surface through to said silicon wafer first surface such that a silicon structure is formed overhanging said recess;

providing a etch stop layer on the first substantially planar surface of the second wafer, such that the etch stop layer is patterned to approximately coincide with said recess;

stopping the selective removal step at or near said etch stop layer to form the silicon structure; and
removing said etch stop layer.

25. (New) A method for making a thin silicon structure as in claim 24, further comprising forming at least one electrode on said glass wafer within said recess.

26. (New) A method for making a thin silicon structure as in claim 25, wherein said electrode forming step includes forming a titanium-platinum electrode.

27. (New) A method for making a thin silicon structure as in claim 25, wherein said electrode forming step includes forming a gold electrode.

28. (New) A method for making a thin silicon structure as in claim 24, wherein said bonding step includes anodic bonding.

29. (New) A method for making a thin silicon structure as in claim 24, wherein said selectively removing silicon step includes a DRIE process.

30. (New) A method for making a thin silicon structure comprising the steps of:

providing a glass wafer or substrate;

providing a silicon wafer having a first substantially planar surface and a second substantially planar surface;

forming a recess in said glass wafer surface or said silicon wafer;

providing a patterned etch stop layer adjacent the silicon wafer, the patterned etch stop layer coinciding with said recess;

bonding said silicon wafer to said glass wafer such that at least part of said silicon wafer first surface bonds to said glass wafer and overhangs said recess;

selectively etching said silicon wafer above said recess from said second surface through to said first surface and stopping at or near said etch stop layer to form a silicon structure that at least partially overhangs said recess; and

removing said etch stop layer.

31. (New) A method for making a thin silicon structure as in claim 30, further comprising forming at least one electrode on said glass wafer that is in alignment with at least part of said recess.

32. (New) A method for making a thin silicon structure as in claim 30, wherein said bonding step includes anodic bonding.

33. (New) A method for making a thin silicon structure as in claim 30, wherein said etching step includes a DRIE process.

34. (New) A method for making a thin silicon structure as in claim 31, wherein said electrode forming step includes forming a titanium-platinum electrode.

35. (New) A method for making a thin silicon structure as in claim 31, wherein said electrode forming step includes forming a gold electrode.

36. (New) A method for making a thin silicon structure as in claim 31, wherein said electrode includes an electrode tab or ear extending nearer the unrecessed surface of the glass wafer or silicon wafer.

37. (New) A method for making a thin structure,
comprising:

- providing a first wafer or substrate;
- providing a second wafer having a first substantially planar surface and a second substantially planar surface;
- forming a recess in said first wafer substrate;
- bonding said second wafer to said first wafer such that at least part of said second wafer first surface bonds to said first wafer so that at least part of said second wafer first surface overhangs said recess;~~and~~
- after said bonding step, selectively removing a portion of said second wafer from said second wafer second surface through to said second wafer first surface such that a thin structure is formed overhanging said recess;
- providing a patterned etch stop layer on the first substantially planar surface of the second wafer, such that the etch stop layer is patterned to coincide with said recess;
- stopping the selective removal step at or near said etch stop layer to form the thin structure; and
- removing said etch stop layer.

and

wherein at least one portion of said second wafer is not connected to another portion of said second wafer.

38. (New) A method for making a thin structure as in claim 37, wherein the first wafer or substrate is a glass wafer or substrate.

39. (New) A method for making a thin structure as in claim 38, wherein the second wafer is a silicon wafer.

40. (New) A method for making a thin structure as in claim 37, wherein the first wafer or substrate is a silicon wafer.

41. (New) A method for making a thin structure as in claim 40, wherein the second wafer is a glass wafer or substrate.

42. (New) A method for making a thin structure comprising the steps of:

providing a first substrate having a first substantially planar surface and a second substantially planar surface;

providing a second substrate having a first substantially planar surface and a second substantially planar surface;

forming a recess in said first substantially planar surface of said first substrate and/or said first substantially planar surface of said second substrate;

securing said first substrate to said second substrate such that said first substantially planar surface of said first substrate faces said first substantially planar surface of said second substrate;

after said securing step, selectively removing a portion of said first substrate from said second substantially planar surface of said first substrate such that a structure is formed overhanging said recess;

providing a etch stop layer on the first substantially planar surface of the second wafer, such that the etch stop layer is patterned to approximately coincide with said recess;

stopping the selective removal step at or near said etch stop layer to form the structure; and removing said etch stop layer.

43. (New) A method for making a thin structure comprising the steps of:

providing a first substrate having a first substantially planar surface and a second substantially planar surface;

providing a second substrate having a first substantially planar surface and a second substantially planar surface;

forming a recess in said first substantially planar surface of said first substrate and/or said first substantially planar surface of said second substrate;

securing said first substrate to said second substrate such that said first substantially planar surface of said first substrate faces said first substantially planar surface of said second substrate;

selectively removing a portion of said first substrate from said second substantially planar surface of said first substrate such that a thin structure is formed overhanging

said recess, said thin structure being doped at a concentration of between zero and 1×10^{18} atm/cm³;

providing a etch stop layer on the first substantially planar surface of the second wafer, such that the etch stop layer is patterned to approximately coincide with said recess;

stopping the selective removal step at or near said etch stop layer to form the thin structure; and

removing said etch stop layer; and

wherein at least one portion of said first substrate is not connected to another portion of said first substrate.

44. (New) A method for making a thin structure, comprising:

providing a first substrate having a first substantially planar surface and a second substantially planar surface;

providing a second substrate having a first substantially planar surface and a second substantially planar surface;

forming a recess in said first substantially planar surface of said first substrate and/or said first substantially planar surface of said second substrate;

providing a etch stop layer on the first substantially planar surface of the second substrate adjacent said recess;

securing said second substrate to said first substrate such that said first substantially planar surface of said first substrate faces said first substantially planar surface of said second substrate;

selectively removing a portion of said second substrate from said second substrate second substantially planar surface through to said second substrate first substantially planar surface such that a thin structure is formed overhanging said recess;

stopping the selective removal step at or near said etch stop layer to form the thin structure; and
removing said etch stop layer.

REMARKS/ARGUMENTS

The present amendment is a replacement amendment in lieu of a previous amendment sent August 28, 2003, and filed September 2, 2003. This amendment was discussed with Examiner Simkovic during the week of September 22, 2003. He had not yet received the previous amendment but would make a note not to enter it and consider the replacement amendment when received. The applicants very respectfully request that the present replacement amendment be entered in lieu of the amendment filed September 2, 2003.

Relative to the amendment, the Office Action dated 05/28/03 indicated claims 1-21 and 23 to be pending.

Claims 1-2, 5-6, 14-18, 20 and 21 were rejected under 35 USC 102(e) as being anticipated by Xiao et al. Claims 3-4 were rejected under 35 USC 103(a) as being unpatentable over Xiao et al.

Claims 7-13 and 23 were allowed. Claim 19 was objected to. Claim 19 was combined with claim 14, from which it depended, as an amended claim 14.

Rejected independent claims 1, 20 and 21 were amended in view of the allowed claims and should be allowable. The pending

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dependent claims should be allowable since they depend from allowed or allowable claims.

The distinction between the present amendment and the previous amendment is that claims 24-44 have been added. The added claims use the terms "etch stop layer". This feature is in the reasons for allowable subject matter for the allowed claims 7-13 and 23. Thus, added claims 24-44 as should likewise be allowable.

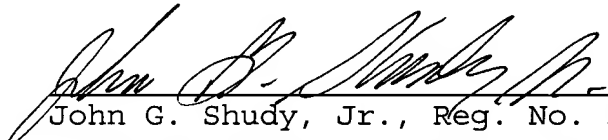
Favorable consideration of the present amendment is very respectfully requested.

Respectfully Submitted,

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By their attorney:

Date: 9/29/03


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